

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference JST-125-PCT	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/JP2004/017681	International filing date (<i>day/month/year</i>) 29.11.2004	Priority date (<i>day/month/year</i>) 28.11.2003
International Patent Classification (IPC) or national classification and IPC H04L9/12, H04B10/00		
Applicant JAPAN SCIENCE AND TECHNOLOGY AGENCY		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising: a. <input type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of _____ sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/JP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☒ the international application as originally filed/furnished
- ☐ the description:
- pages _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☐ the claims:
- nos. _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* _____ received by this Authority on _____
- nos.* _____ received by this Authority on _____
- ☐ the drawings:
- sheets _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1.	Statement		
	Novelty (N)	Claims <u>1-20</u>	YES
		Claims _____	NO
	Inventive step (IS)	Claims _____	YES
		Claims <u>1-20</u>	NO
	Industrial applicability (IA)	Claims <u>1-20</u>	YES
		Claims _____	NO
2.	Citations and explanations (Rule 70.7)		
	<p>Document 1: Takeshi Nishioka et al., "Kanryugata Ryoushiken Haifu", 2002 Ango to Joho Security Symposium Yokoshu, 29 January 2002</p> <p>Document 2: JP 2003-289298 A (Nihon University), 10 October 2003</p> <p>Document 3: JP 2002-340566 A (Fujikura Ltd.), 27 November 2002</p> <p>Claims 1 to 5, 10 to 15 and 20</p> <p>The inventions set forth in claims 1 to 5, 10 to 15 and 20 do not involve an inventive step in the light of document 1 cited in the international search report.</p> <p>The "first station", "transmission path", "a means for reversing the traveling direction of the optical pulses", "a means for imparting a phase difference corresponding to a random number bit value", "a means of dividing optical pulses up into orthogonal polarization components", "a means of rotating each polarization by 90°", and "a means of synthesizing the orthogonal polarization components and emitting these into the transmission path once more" are disclosed in document 1 "Fig. 3: Block Diagram of Mixed Optical System".</p> <p>In addition, document 1 indicates that in loop-type</p>		

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Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

optical systems and Faraday mirror-type optical systems, the phase is staggered by half a wavelength, therefore the observation results of APD1 and APD2 are inverted (see "4. Experiments to Substantiate the Principle"), and it would be easy for a person skilled in the art to constitute an optical system to impart a phase difference of 180° between orthogonal polarization components in order to achieve the same results as a Faraday mirror-type optical system.

Claims 6 to 8 and 16 to 18

The inventions set forth in claims 6 to 8 and 16 to 18 are not disclosed in documents 1 and 2 cited in the international search report.

Document 2 indicates that "polarized wave-conserving fiber" and "a Faraday rotator" are used as means of changing the polarization direction (see paragraphs [0030] to [0036]).

"Polarized wave-conserving fibers" and "Faraday rotators" are known devices as means of changing polarization direction, and it would be easy for a person skilled in the art to employ these devices as means of changing polarization direction in the invention set forth in document 1.

Claims 9 and 19

The inventions set forth in claims 9 and 19 do not involve an inventive step in the light of documents 1 and 3 cited in the international search report.

Document 3 indicates that light which is coupled at a light branching and coupling element is branched into optical fiber for connection and a non-reflecting

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termination (see [claim 7]; paragraphs [0025] to [0038];
fig. 4).

A non-reflecting termination is a known feature, as
set forth in document 3, therefore it would be easy for a
person skilled in the art to constitute the terminal of
the polarizing beam splitter set forth in document 1 as a
non-reflecting termination as necessary.